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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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TITLE

EFFECT OF RED TURPENTINE BEETLE ATTACKS ON CUTOVER AREAS IN PROVIDING GREEN TREES MORE SUSCEPTIBLE TO PRIMARY BARKBEETLES

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Forest Insect Laboratory
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EFFECT OF RED TURPENTINE BEETLE ATTACKS ON CUTOVER AREAS IN PROVIDING GREEN TREES MORE SUSCEPTIBLE TO PRIMARY BARKBEETLES

INTRODUCTION

This report is prepared as a result of studies undertaken on the Black's Mountain Experimental Forest in a cooperative program between the California Forest and Range Experiment Station and the Bureau of Entomology and Plant Quarantine.

A portion of the work on the experimental area being conducted by the Bureau consists of: (1) the marking of all high risk trees to be removed in the sanitation-salvage logging program, and (2) a determination of what effect the light cut has in reducing subsequent loss. In determining what effect the light cut has on a reduction of loss, periodic cruises are made of treated and untreated areas for a comparison of loss conditions. Occasionally, during the course of this loss survey on areas only recently subjected to the sanitation-salvage treatment, a few trees were found infested with primary barkbeetles. In attempting to determine why these few trees on the recently cut areas were being attacked and killed; that is, why had not these few trees been previously detected as being high risk and removed in the cutting operation; it was observed that some of the infested trees occurred close to a stump where a high risk tree had been cut and removed. In a few cases, the basal portion of the infested trees had been attacked by D. valens Lec. and at the time, it was felt that the red turpentine beetle which had attacked the freshly cut stump had "overflowed" and also attacked the green tree standing nearby, weakening the green tree sufficiently to permit attacks by other barkbeetles.

Keen (2) has pointed out that "ordinarily D. valens Lec. is not considered an aggressive tree killer but it does do considerable damage and so weakens trees as to make them more susceptible to attack by other barkbeetles." Recently both Keen (3) and Bedard (1) have indicated that they consider the red turpentine beetle as a contributing factor in helping to make some green ponderosa pine trees highly susceptible to barkbeetle attacks.

During 1939 a study was undertaken at Black's Mountain to determine whether the activity of the turpentine beetle in green stumps following cutting operations was a contributing factor in causing subsequent loss in the reserve stand. As a result of observations pertaining to D. valens activity, it was hoped that conclusions might be drawn in regard to recommendations in the cutting of highly susceptible trees for a reduction of subsequent loss. For example, it might be concluded that when a high risk tree is marked for cutting within a few feet of another tree, both trees should be removed in the logging operation because of the increased liability of loss in the remaining green tree through attack by the turpentine beetle.

STUDY AREA

Each season the Experiment Station establishes a series of from four to six 20-acre plots on the experimental area to demonstrate methods-of-cutting. Each plot, exclusive of the check area, is subjected to various types of cutting practice. Since the various degrees of cutting, presented many opportunities to select and observe paired or grouped trees where one or more had been cut and the other left standing, it was decided that these plots would be quite sufficient for observing the activities of D. valens Lec. for arriving at an answer to the objective undertaken.

FIELD OBSERVATIONS

From impressions gained prior to the time this study was set up, it was felt that the proximity of green tree to freshly cut stumps was the primary factor in causing turpentine beetle attacks in the green tree which then led to complete infestation by other barkbeetles. Not knowing what the maximum distance would be between stump and tree in which valens attacks on the stump might serve as a focal contamination source to the green tree, all tree pairs within a basal radius of 10 feet, one of which had been cut and the other left standing, were selected from the 100 acres of plots for periodic observations of turpentine beetle activity.

Immediately following the 1939 cutting operation, 86 pairs of trees and stumps within the 10-foot basal radius were placed under observation. Similarly, 58 pairs of trees were selected on the comparable uncut area to check valens activity under normal conditions. Field observations, taken twice during the fall of 1939 and again in the spring of 1940, were designed only to record the number and successfulness of turpentine beetle attacks. The relative success of the attacks in green trees was judged from the evidence shown from the pitch tubes, not by cutting into the bark. Plans were made to determine the degree of success and abundance of brood in the standing trees only should such a tree become fully girdled or completely infested by other barkbeetles. All attacks in the stumps were considered as successful. A summary of valens attacks in stumps and green trees on the cutover areas during the period extending from September 1939 through May 1940 is given in Table 1.

Contrary to expectations as indicated from previous observations, not a single D. valens attack was recorded on the 58 pairs of trees on the check area, even though some of the trees were considered as being in a weakened or dying condition.

Table 1

Paired Observations of D. valens Attacks on Stumps and Green Trees

Distance from freshly cut stump to nearest standing green tree.	Number of paired observations	Number of attacks	
		Stump	Green tree
Stump and green tree touching at base	13	22	3*
0 to 1 foot	6	9	0
1 to 2 feet	5	9	0
2 to 3 feet	7	18	1
3 to 4 feet	7	31	2
4 to 5 feet	4	13	1
5 to 6 feet	9	37	2
6 to 7 feet	6	50	1
7 to 8 feet	8	19	0
8 to 9 feet	10	43	0
9 to 10 feet	11	52	0
Total	86	303	10

*One of the three attacks considered as successful.

It is fairly obvious from the above table that freshly cut stumps are quite attractive to attacking turpentine beetle adults. However, the table does not indicate that the attractive qualities of the green stumps serve as focal contaminating points for, or more than slightly influence attacks on nearby standing green trees. Since valens activity on the check area was nil, a logical assumption explaining the 10 attacks to trees on the cut areas is that the attacking population of adults within this localized and general area were attracted to the freshly cut areas. However, since Table 1 shows that there is a considerable spread in the number of attacks per stump, this variation would indicate that the relative position of the freshly cut stump in relation to the remaining green stand has little influence in the selection of individual stumps as host material by the attacking population. On that basis and because of the absence of attacks on trees in the control area, two conditions could be made in the assumption as given:

1. Freshly cut stumps, being attractive host material, tend to draw the attacking population of turpentine beetles from a localized general area into the cut area, and as a result the likelihood of attacks to the reserve stand is considerably increased, or

2. Attacking D. valens adults are attracted to a freshly cut stump and as a result tend to attack any tree standing nearby.

The data collected is insufficient to substantiate either supposition. However, from general impressions, the writer is inclined to believe that valens attacks on green trees in the cutover areas are more closely associated with proximity of green tree and stump than increased liability to attacks through the attraction of attacking adults to the cutover area in general. This impression is feebly substantiated by the data presented in Table 1 which shows that approximately 1/3 of all attacks in green trees occurred when the green tree and freshly cut stump were touching. In addition, the single attack that was judged as being successful in the green trees occurred where stump and tree had been growing together.

TENTATIVE CONCLUSIONS

The only conclusion to be drawn from the data collected thus far is that there appears to be a tendency for D. valens Lec. to concentrate attacks on cutover areas, attacking an occasional green tree along with the freshly cut stumps. Also, the liability of green trees to become attacked is greater when the standing green tree is growing close enough to touch the freshly cut stump.

DESIRABILITY OF FURTHER STUDIES

Although the losses which have occurred on the areas recently subjected to the light sanitation-salvage cut have not been numerous, and in only a few cases could such loss be directly attributed to a succession of barkbeetle attacks following turpentine beetle attacks in the lower bole, it seems desirable to continue with observations of D. valens activity to provide sufficient information to draw definite conclusions. Loss reduction subsequent to the light sanitation-salvage operation on the experimental area has shown that this type of treatment holds considerable promise as a measure of insect control in the eastside pine areas. Should this type of treatment prove itself for longer periods of time it would seem justifiable to make broader recommendations for the light cut to be used as an insect control measure. For that reason it seems necessary that we attempt to study all factors which appear to contribute to losses on areas which have been subjected to the sanitation-salvage treatment.

SUGGESTED POINTS TO BE CONSIDERED

1. It is realized that this study was undertaken at a time that was not at all in agreement with the peak flight of the attacking population. Additional work should be started in the early spring so that the effect of the entire attacking period could be measured. Observations also will have to be continued over a longer period of time.

2. Observational methods to determine number of attacks left much to be desired. No consideration was given the possibility of a build up of populations which might be expected on the cutover areas, a factor which might very likely result in an increased number of attacks in the reserve stand.

3. Population trends were not considered in the present study. In certain years, D. valens activity has been considerable in both virgin and cutover areas. That valens was relatively inactive in this area during 1939 and 1940 is shown from the absence of attacks on trees in the check area. Turpentine beetle activity should be checked over larger areas and for several seasons to determine seasonal population trends.

4. The wide spread in number of attacks per stump and tree standing within a 10-foot radius would indicate that the 10-foot spread is not necessarily a maximum distance to prevent the attractive qualities of the stump to influence attacks to the green tree. To determine this point, number of attacks and distances between all trees and stumps on the study area should be made.

SUMMARY

During the fall of 1939 a study was undertaken on the Black's Mountain Experimental Forest in an attempt to determine whether the activities of the red turpentine beetle in green stumps following cutting operations was a factor in causing subsequent loss in green trees standing nearby.

Observations of D. valens activity on cutover areas were concentrated on pairs of trees standing within a basal radius of 10 feet of each other where one tree had been cut and the other left standing. A check of normal turpentine beetle activity was made on an area undisturbed by logging procedure.

It was found that D. valens Lec. apparently preferred recently cut areas in which to confine their activity, a majority of all attacks occurring in freshly cut stumps. Also, it was tentatively determined that the liability of green trees on cutover areas to be attacked was somewhat greater when the tree was standing within a few feet or actually touching the freshly cut stump.

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